

APPENDIX A

Table of Contents

A1.	OVERVIEW	A-2
A2.	RESPONSIBILITIES.....	A2
A3.	SAFETY REVIEW PROCESS	A-3
A4.	PAYLOAD HAZARD ANALYSIS	A-5
A4.1	Payload Safety Matrix	A-8
A4.2	Description Data Form	A-11
A4.3	Payload Hazard Report	A-14
A4.4	Payload Safety Noncompliance Report (Waiver)	A-16
A4.5	Additional Safety Requirements	A-18
A5.	SAFETY DATA PACKAGE (SDP)	A-25

List of Figures

Figure A.1	Payload Safety Review Process	A-4
Figure A.2	Hazard Analysis Process	A-7
Figure A.3	Payload Safety Matrix	A-9
Figure A.4	NSTS Payload Safety Requirements Applicability Descriptive Data Form	A-10
Figure A.5	STS Payload Ground Safety Requirements Applicability Matrix	A-12
Figure A.6	STS Payload Safety Requirements Applicability Descriptive Data	A-13
Figure A.7	Payload Hazard Report	A-15
Figure A.8	Payload Safety Noncompliance Report	A-17
Figure A.9	Radiation Training and Experience Summary (Ionization Radiation) Form	A-19
Figure A.10	Radioactive Material Use Request	A-20
Figure A.11	Ionizing Radiation Source Data Sheet	A-21
Figure A.11a	Ionizing Radiation Source Data Sheet (Cont'd)	A-22
Figure A.12	Training and Experience Summary Non-Ionizing Radiation Users Form	A-23
Figure A.13	Non-Ionizing Radiation Protection Source Questionnaire.....	A-24
Figure A.14	Payload System Safety Data Submittal Summary	A-26
Figure A.15	HH Sample Mission Experiment Safety Schedule	A-27

List of Tables

Table A.1	Basic Hazard Groups. Causes. and Effects	A-6
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APPENDIX A

PAYLOAD SAFETY REQUIREMENTS

A1. OVERVIEW

All payloads using the STS must meet certain design and operational requirements prior to being considered "safe". Payloads and GSE must not be capable of generating or sustaining any failure mode that will result in a hazard to the flight and ground personnel, the STS, GSE, and other payloads. A hazard is defined as the presence of a potential risk situation caused by an unsafe act or condition that could disable or cause damage to the Orbiter, its crew, ground processing facilities or personnel during pre- and post- launch activities. Basic requirements for payload safe design and operation are provided for in the following NASA documents:

NSTS 1700.7 (current issue*) - Safety Policy Requirements for Payloads Using the Space Transportation System (STS), January 1989.

SAMTO HB S-100, KHB 1700.7 (current issue*) - Space Transportation System Payload Ground Safety Handbook.

All payloads must comply with the guidelines and requirements set in these documents.

This section summarizes information from NSTS 1700.7 latest version to aide the customer in understanding the requirements and guidelines that must be followed in order to obtain safety certification for their payload. This section is not a substitute for NSTS 1700.7 latest version which takes precedence and must be adhered to by the customer for their payload. KHB 1700.7 latest version is the governing document for the GSE and ground operations.

* Current issue includes all future changes and revisions.

A2. RESPONSIBILITIES

A customer representative should be designated as the technical point of contact between the HH Project and the customer. This representative is called the Payload Manager. The Payload Manager is responsible for assuring the safety of his payload and to implement the requirements of NSTS 1700.7 and KHB 1700.7. Each customer payload shall have a system safety support person to advise the payload manager and designers, and to act as a point of contact for safety matters. The HH Project, acting as the responsible "payload organization," interfaces with the NSTS on behalf of the group of individual payload elements or experiments and carrier systems which comprise a Shuttle payload. GSFC will assign a Mission Manager who will be the single technical point of contact for GSFC and interface with the payload Manager. The HH Project Safety Manager will support the NASA Mission Manager in the safety review process. Payload shall have a system safety support person as a member of the payload team to advise. All payload safety data will be reviewed and approved by GSFC prior to submittal to JSC/KSC.

A3. SAFETY REVIEW PROCESS

The safety review process between the customer, GSFC, and the STS begins 18-24 months prior to launch with the development of safety-related information as part of the Payload Accommodations Conference. The review process culminates just prior to launch with the Final Safety Inspection. Aspects of safety-related issues extend into flight operations as well. Figure A.1 represents an overview of the safety review process.

The system safety requirements associated with use of the Shuttle are extensive, and are intended to insure the safety of ground processing and flight personnel, as well as the Shuttle Orbiter and flight hardware. The phased safety reviews and safety data packages, through which the project demonstrates compliance with these requirements, are major mission milestones.

Payload Safety Review Process

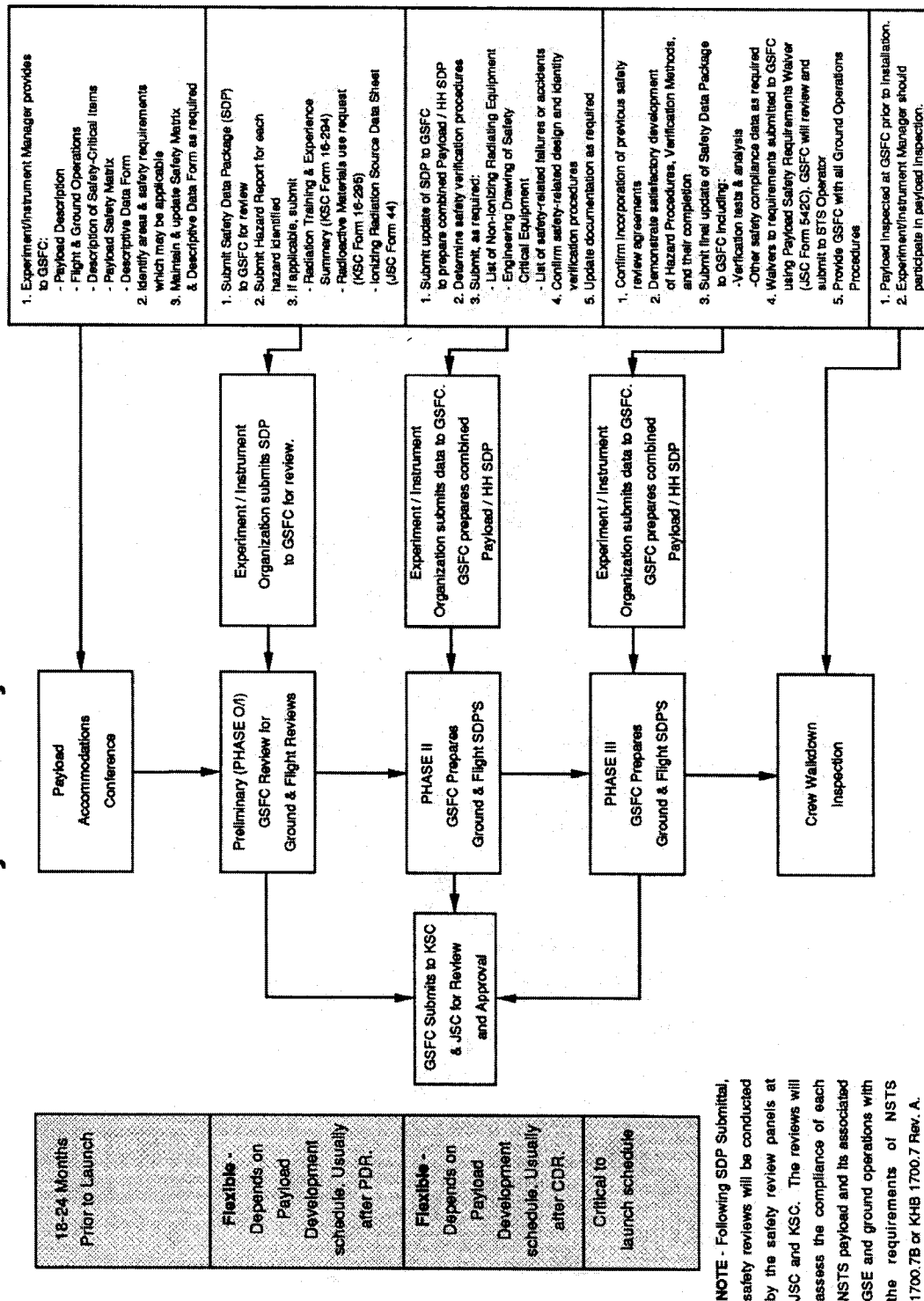


FIGURE A.1 PAYLOAD SAFETY REVIEW PROCESS

A4. PAYLOAD HAZARD ANALYSIS

A hazard analysis is the technique used to systematically identify, evaluate and resolve hazards. Typically, such analyses assess the entire system and its interfaces. Results of the hazard analysis leads to one or more of the following:

- Improved payload safety design,
- Development of controls to mitigate hazards,
- Establishment of acceptable risk levels.

There may be many factors contributing to a hazard, however, there are basic hazard groups that are applicable to HH payloads. Those hazard groups and representative examples of their causes and effects are summarized in Table A.1. Figure A.2 provides an overview of the hazard analysis process.

TABLE A.1 BASIC HAZARD GROUPS, CAUSES, AND EFFECTS

<u>Hazard Type</u>	<u>Definition</u>	<u>Possible Cause</u>	<u>Possible Effect</u>
Collision	Payloads and/or Elements Break Loose and Impact Structures, Other Payloads, or Ground Personnel	Structural Failure Procedural Error, Inadequate Ground Handling Equipment	Penetration of Payload, Personnel Injury
Contamination	Release or Accumulation of Particular Matter or The Placement of the Wrong Material in a Container	Leakage, Spillage, Outgassing, Abrasion, Improper Cleanliness Procedures, Inappropriate Materials Usage	Degraded Atmosphere or Equipment Operation, Personnel Injury
Corrosion	Structural Degradation of Metallic and Non-Metallic Equipment	Leakage, Material Incompatibility, Environmental Extremes, Short Circuits	Mechanical Failures, Premature Wear, Seizure
Electrical shock	Electrical current passing through any portion of the body	Human error, procedural error, equipment failure, static discharge, short circuit	Personnel Injury
Explosion	Violent Release of Energy Due to Over-pressurization	Susceptible Equipment, Batteries, Pumps, Motors, Blowers, Generators, Lasers, Etc.	Payload Damage, Personnel Injury
Fire	Rapid Oxidation of Payload Element Combustibles Flammability of Materials	Fuel and Oxidizer Exposed to Ignition Source	Payload Damage, Personnel Injury
Radiation	Exposure (Human or Equipment) To: Ionizing Radiation, UV or IR Light, Lasers, Electromagnetic or RF-Generating Equipment	Leaky or Inadequate Shielding	Degraded or Damaged Payload or Equipment Personnel Injury
Temperature extremes	Exposure to abnormal temperature extremes (hot or cold)	Insulation breakdown, short circuits, seal leaks plumbing failures procedural error, human error	Degraded or damaged payload or equipment, personnel injury
Injury and Illness	Payloads Break Loose and Impact Ground Personnel and Release of Toxic Materials	Procedural Error, Inadequate Ground Handling Equipment Leakage or Spillage of Toxic Materials	Personnel Injury, Payload Penetration Degraded a Atmosphere or Equipment Operation

Hazard Analysis Process

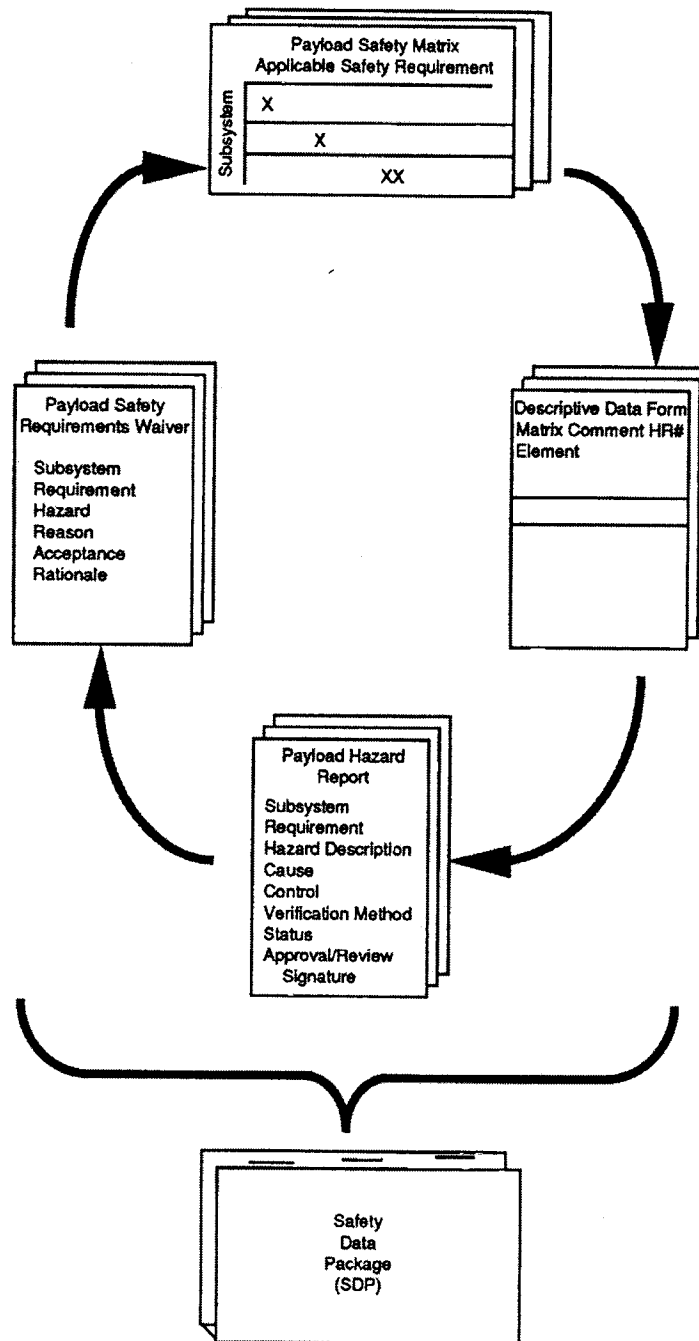


FIGURE A.2 HAZARD ANALYSIS PROCESS

A4.1 Payload Safety Matrix

The initial version of the Payload Safety Requirements Applicability Matrix is required early in the safety review cycle and should be kept up to date throughout the development process. This form and the Payload Ground Safety Requirements Applicability Matrix documents are used to foresee and assess interrelationships between the basic hazard groups and subsystems contained in the payload. Examples of these forms are presented in Figures A.3 and A.5.

[illegible]

A-9

NSTS PAYLOAD SAFETY REQUIREMENTS APPLICABILITY DESCRIPTIVE DATA		Page ____ Of ____
		Date:
PAYLOAD:		Phase:
MATRIX ELEMENT REFERENCE NO.	HAZARD REPORT NUMBER	HAZARD TITLE

JSC Form 1090A (Rev Oct 88) Previous Editions Are Obsolete

FIGURE A.4 NSTS PAYLOAD SAFETY REQUIREMENTS APPLICABILITY DESCRIPTIVE DATA FORM

A4.2 Description Data Form

Similar to the Payload Safety Matrix, the Payload Safety Requirements Applicability Descriptive Data Forms are required early in the safety cycle and must be continually updated. These forms (Figure A.4 and A.6) are completed for each subsystem having a "X" in any corresponding hazard group box on the Payload Safety Matrix. The Descriptive Data Forms provide a listing of the hazard groups applicable to each subsystem and cross-references each hazard to the applicable technical requirement from NSTS 1700.7B and KHB 1700.7, Revision A. Upon completion of the Payload Safety Matrix and the Descriptive Data Form, the customer has a comprehensive list of all the payload safety hazard issues that must be addressed in order for the payload to be granted safety certification.

STS PAYLOAD GROUND SAFETY REQUIREMENTS APPLICABILITY MATRIX

DATE: _____

1. PAYLOAD:

2. PAYLOAD ORGANIZATION:

3. PHASE:

4. PAGE OF

5. PAYLOAD AND GSE ELEMENTS

6. KHB 1700.7 REQUIREMENTS

7. SAFETY ANALYSIS BY: (NAME, ORG, INITIAL)

DATE

8. LEGEND:

☐ NOT APPLICABLE
 ☒ APPLICABLE: NO HAZARD IDENTIFIED

☒ APPLICABLE: HAZARD IDENTIFIED
 ☐ WAIVER REQUIRED

9. IMPLEMENTATION PERSONNEL

DATE

DATE

DATE

10. PAYLOAD ORGANIZATION PERSONNEL

DATE

FIGURE A.5 STS PAYLOAD GROUND SAFETY REQUIREMENTS APPLICABILITY MATRIX

10. STS PAYLOAD SAFETY REQUIREMENTS APPLICABILITY DESCRIPTIVE DATA		
MATRIX ELEMENT	COMMENTS	H/R #

GSFC-302-SS-02B (2/83)

FIGURE A.6 STS PAYLOAD SAFETY REQUIREMENTS APPLICABILITY DESCRIPTIVE DATA

A4.3 Payload Hazard Report

Following the completion of the safety analysis and identification of potential hazards, a Payload Hazard Report must be completed. This report is to be completed for each hazard identified on the Descriptive Data Form. Each hazard report should stand alone. Data required to understand the hazard, the hazard controls, and safety verification methods including the organization responsible for each verification, should be attached to the report. When functional diagrams are supplied, the pertinent information shall be clearly identified, (e.g., controls, inhibits, monitors, etc.).

Information for Hazard Reports, is to be submitted to the HH Safety Manager. This data is included in a Payload/HH combined SDP.

The hazard report is used to track hazards identified throughout the lifecycle of the payload. It contains NASA review and approval signatures, acknowledging the possibility of hazard occurring, and the result rationale that has been reviewed in accordance with NASA standards. Figure A.7 represents the Payload Hazard Report.

PAYLOAD HAZARD REPORT		No.
PAYLOAD		PHASE
SUBSYSTEM	HAZARD GROUP	DATE
HAZARD TITLE		
APPLICABLE SAFETY REQUIREMENTS		HAZARD CATEGORY
		CATASTROPHIC
		CRITICAL
DESCRIPTION OF HAZARD		
HAZARD CAUSES		
HAZARD CONTROLS		
SAFETY VERIFICATION METHODS		
STATUS OF VERIFICATION		
APPROVAL	PAYLOAD ORGANIZATION	STS
PHASE I		
PHASE II		
PHASE III		

JSC Form 542B (Rev Nov 82)

FIGURE A.7 PAYLOAD HAZARD REPORT

A4.4 Payload Safety Noncompliance Report (Waiver)

A waiver request form (as shown in Figure A.8) must be submitted for noncompliance. This request will be returned to GSFC for review in such cases when safety requirements cannot be met. The Mission Manager will negotiate with the STS on behalf of the customer concerning the acceptability of the waiver request. Should the waiver be denied, the customer must meet the requirement through design changes to the payload or run the risk of having the payload denied the opportunity for flight on the STS.

PAYLOAD SAFETY NONCOMPLIANCE REPORT	NO.	DATE
TITLE (Brief reference to noncompliance)		
PAYLOAD IDENTIFICATION (Include reference to applicable payload element, subsystem, and/or component)		
APPLICABLE REQUIREMENT		
DESCRIPTION OF NONCOMPLIANCE (Specify how the design or operation does not meet the safety requirements)		
HAZARD OR HAZARD CAUSE (Include reference to Payload Hazard Report)		
REASON REQUIREMENT CANNOT BE FULFILLED		
RATIONALE FOR ACCEPTANCE (Define the design feature or procedure used to conclude that the noncompliance Condition is safe. Attach applicable support data, i.e. drawings, test reports, analyses, etc.)		
APPROVAL SIGNATURES		
PAYLOAD ORGANIZATION		DATE
WAIVER APPROVAL	DEVIATION APPROVAL	
EFFECTIVITY	EFFECTIVITY	
STS OPERATOR	DATE	STS OPERATOR DATE

JSC Form 542C (Rev Mar 83)

FIGURE A.8 PAYLOAD SAFETY NONCOMPLIANCE REPORT

A4.5 Additional Safety Requirements

Depending on the design of the payload and its operating characteristics, beginning at Phase O/I Safety Data Package (SDP) submission timeframe, the customer may be required to submit the last version of additional forms such as:

- a. Radiation Training and Experience Summary
(Figure A.9)
- b. Radioactive Materials Use Request
(Figure A.10)
- c. Ionizing Radiation Source Data Sheet
(Figure A.11A and A.11B)
- d. Training and Experience Summary Non-Ionizing Radiation Users
(KSC Form 16-450) (Figure A.12)
- e. Non-Ionizing Radiation Protection Source Questionnaire
(KSC Form 16-453) (Figure A.13)

It is important to address and identify special safety requirements and document them, beginning at Phase O/I SDP as soon as possible. These requirements may include:

- a. Special handling or testing during installation or removal of the payload
- b. Special environments during certain mission phases
- c. Special flight operations.

RADIATION TRAINING AND EXPERIENCE SUMMARY (IONIZING RADIATION) <i>Note: (Complete unshaded sections of Form only) (Please type/print legibly, prepare original and one copy)(Instructions for completion on reverse)</i>					
I. GENERAL INFORMATION					
NAME/TELEPHONE NUMBER		DATE OF BIRTH	ORGANIZATION/MAILCODE OR ADDRESS		AUTHORIZATION NUMBER
SOCIAL SECURITY NO.	TYPE OF USER AREA RADIATION OFFICER MAINTENANCE USER OTHER USE SPVR/ CUSTODIAN			SYSTEM/DEVICE TO BE USED	
II. TRAINING (Use supplemental sheets as needed)					
TYPE OF TRAINING		WHERE TRAINED	DURATION	ON-THE-JOB	FORMAL COURSE
A. Principles And Practices Of Radiation Protection				YES NO	YES NO
B. Radioactivity Measurement Standard- Iization Monitoring Techniques And Instruments				YES NO	YES NO
C. Mathematics And Calculations Basic To The Use And Measurement Of Radioactivity				YES NO	YES NO
D. Biological Effects Of Radiation				YES NO	YES NO
III. EXPERIENCE (Use supplemental sheets as needed)					
A. RADIOACTIVE MATERIALS YES NO <i>(Describe below)</i>					
RADIONUCLIDE	MAXIMUM AMOUNT		LOCATION	TYPE OF USE	DURATION
B. ACCELERATOR OR X-RAY EQUIPMENT YES NO <i>(Describe below)</i>					
TYPE	MAXIMUM ENERGY		LOCATION	TYPE OF USE	DURATION
IV. REFERENCE DOCUMENTS					
I HAVE READ AND UNDERSTAND APPLICABLE PORTIONS OF THE FOLLOWING:					
KHB 1860.1		YES	NO		
NRC REGULATIONS, 10 CFR 19 AND 20		YES	NO	N/A	
KMI 1860.1 <i>(If applicable)</i>		YES	NO	N/A	
ESMCR 160-1 <i>(If applicable)</i>		YES	NO	N/A	
FLORIDA REGULATIONS, CHAPTER 10D-56		YES	NO	N/A	
SIGNATURE OF APPLICANT				DATE	
V. AUTHORIZATIONS					
HEALTH PHYSICS		DATE	KSC RADIATION PROTECTION OFFICER		DATE
ESMC RADIATION PROTECTION OFFICER <i>(If applicable)</i>		DATE	CHMN, KSC RADIATION PROTECTION COMMITTEE		DATE

FIGURE A.9 RADIATION TRAINING AND EXPERIENCE SUMMARY (IONIZATION RADIATION) FORM

RADIOACTIVE MATERIAL USE REQUEST <i>(Prepare in original and four copies)</i>			
FROM (NAME) <i>(Please print)</i>		OFFICE CODE	DATE
REF. NUMBER*			
TO: KSC RADIATION PROTECTION OFFICER (RPO) VIA HEALTH PHYSICS SECTION (OMEHS)			
RADIOACTIVITY REQUIREMENTS			
A. ELEMENT AND ISOTOPE		B. PHYSICAL FORM	
C. TOTAL QUANTITY REQUIRED (MC OR UNITS)		D. ESTIMATED ACTIVITY PER EXPERIMENT (MC OR UNITS)	
E. WASTE CONCENTRATIONS & AMOUNTS	LIQUID	SOL ID	
2. TITLE OR BRIEF DESCRIPTION OF PROPOSED PROJECT			
3. PROPOSED PROCEDURE (INCLUDING SPECIAL PRECAUTIONS)			
		3A. LICENSE NO.	3B. NRC <input type="checkbox"/> STATE OF
4. LOCATION OF USE	BUILDING NUMBER	ROOM NUMBER	AREA ZONE NUMBER
5. USERS		6. PERIOD COVERED BY REQUEST	
		FROM _____ TO _____	
7. HEALTH PHYSICS EQUIPMENT REQUIREMENTS			
ORIGINATOR		SUPERVISOR'S SIGNATURE	
APPROVALS			
SIGNATURE (OMEHS HEALTH PHYSICS)			DATE
SIGNATURE (KSC RADIATION PROTECTION OFFICER)			DATE
SIGNATURE (CHAIRMAN RSC)			DATE

KSC Form 16-295NS (Rev. 5/77)

FIGURE A.10 RADIOACTIVE MATERIAL USE REQUEST

IONIZING RADIATION SOURCE DATA SHEET
SPACE FLIGHT HARDWARE AND APPLICATIONS
Lyndon B. Johnson Space Center

Complete Items 1 through 10 and Part A for radioisotope sources and Part B for ionizing radiation - producing equipment.

IDENTIFICATION

1. PAYLOAD DESIGNATION/EXPERIMENT	2. STS NO. AND/OR LAUNCH DATE
3. SOURCE USING ORGANIZATION	4. ADDRESS
5. CONTACT	6. TELEPHONE
7. PAYLOAD SPONSOR/MANAGER	8. ADDRESS
9. CONTACT	10. TELEPHONE

PART A. RADIOISOTOPE SOURCES

I. SOURCE DESCRIPTION

1. ISOTOPE	2. TOTAL QUANTITY (MILLICURIE) <i>(Include determination date.)</i>	3. NUMBER OF SOURCES*
4. CHEMICAL FORM	5. PHYSICAL STATE	
6. SOURCE SEALED 0 Yes 0 No	7. IDENTIFICATION NOS.	
8. MANUFACTURER	9. ADDRESS	

II. SOURCE USE DATA

1. PURPOSE:

- ☐ EXTERNAL CALIBRATION ☐ INFLIGHT CALIBRATION
☐ OTHER *(Describe)*
☐ CREW INVOLVEMENT/REQUIREMENTS *(Include nominal and contingent situations.)*

III. SOURCE DIAGRAM

DETAILS ON SEALING, TECHNIQUES AND DIMENSIONS:

FIGURE A.11 IONIZING RADIATION SOURCE DATA SHEET

IV. TEST DATA

1. DATA SOURCE LEAK TESTED	2. RESULTS (MICROCURIE)
3. THERMO-VACUUM QUALIFIED TO:	
_____ MM HG	_____ DEGREE C.
DATE	

V. PRE-FLIGHT TRANSFERS

1. LOCATIONS WHERE SOURCE IS TO BE USED OR STORED AND APPROXIMATE DATES		
A. LOCATIONS	B. DATED FROM	TO
2. SOURCE CUSTODIAN/RADIATION SAFETY OFFICER		TELEPHONE

VI. POST-FLIGHT DISPOSITION

OUTLINE REQUIREMENTS:

PART B. IONIZING RADIATION PRODUCING EQUIPMENT**I. EQUIPMENT CHARACTERISTICS**

1. TYPE OF RADIATION PRODUCED:	
2. MAXIMUM ENERGY LEVEL	3. OPERATING ENERGY LEVEL
4. DURATION OF OPERATION	5. NO. OF UNITS
_____ HOURS TOTAL, ALL UNITS	6. PULSED UNIT DUTY CYCLE

II. RADIATION CHARACTERISTICS

1. RADIATION INTENSITY OF FLIGHT CONFIGURED UNIT	2. SECONDARY RADIATIONS PRODUCED	
_____ RAD/HR @ _____ METERS	ENERGY LEVEL	TYPE
	_____ KEV	

III. EQUIPMENT USE DATA

1. CREW INVOLVEMENT/PROCEDURES:	
2. RADIATION PRODUCTION WARNING SYSTEM:	
0 Yes (Describe)	0 No
3. SAFETY INTERLOCK SYSTEM:	
0 Yes (Describe)	0 No

NASA-JSC

FIGURE A.11A IONIZING RADIATION SOURCE DATA SHEET (CONT'D)

TRAINING & EXPERIENCE SUMMARY NON-IONIZING RADIATION USERS <i>(PLEASE TYPE/PRINT LEGIBLY)</i> (NOTE - COMPLETE UNSHADED SECTIONS OF FORM ONLY)				
I. GENERAL INFORMATION				
A. NAME	B. DATE OF BIRTH	C. ORGANIZATION/MAIL CODE	D. REFERENCE NO.	
E. SOC SEC NO.	E. TYPE OF USER		F. SYSTEM/DEVICE TO BE USED	
	<input type="radio"/> AREA RADIATION OFFICER <input type="radio"/> MAINTENANCE <input type="radio"/> OPERATOR <input type="radio"/> OTHER			
II. TRAINING (USE SUPPLEMENTAL SHEETS AS NEEDED)				
TYPE OF TRAINING	YES	NO	WHERE TRAINED	DURATION
A. Biological Effects				
B. Radiation Protection				
C. Other				
III. EXPERIENCE (USE SUPPLEMENTAL SHEETS AS NEEDED)				
TYPE OF EXPERIENCE		LOCATION		DURATION
A.				
B.				
C.				
D.				
IV. REFERENCE DOCUMENTS				
I have read and understand the following:				
A. KMI 1860.1	<input type="radio"/> Yes	<input type="radio"/> No		
B. KHB 1860.2	<input type="radio"/> Yes	<input type="radio"/> No		
C. 29 CFR 1910.97	<input type="radio"/> Yes	<input type="radio"/> No		
D. ESMC Regulation 160-1 (If Applicable)	<input type="radio"/> Yes	<input type="radio"/> No	<input type="radio"/> N/A	
_____ Signature of Applicant			_____ Date	
V. AUTHORIZATIONS				
HEALTH PHYSICS			DATE	
KSC RADIATION PROTECTION OFFICER			DATE	
ESMC RADIATION PROTECTION OFFICER (IF APPLICABLE)			DATE	
CHMN. KSC RADIATION PROTECTION COMMITTEE			DATE	

FIGURE A.12 TRAINING AND EXPERIENCE SUMMARY NON-IONIZING RADIATION USERS FORM

NON-IONIZING RADIATION PROTECTION SOURCE QUESTIONNAIRE (PLEASE TYPE/PRINT LEGIBLY)			
ORIGINATOR	ORG/MAIL CODE	PHONE	DATE
SUPERVISOR	ORG/MAIL CODE	PHONE	DATE
DEVICE/SYSTEM DESCRIPTION (USE SUPPLEMENTAL SHEETS AS NEEDED)			
TYPE 0 RADIOFREQUENCY/MICROWAVE		0 LASER/OPTICAL	
MANUFACTURER AND YEAR			
MODEL AND SERIAL NO.			
FREQUENCY/WAVELENGTH			
MAX. POWER OUTPUT			
PULSE WIDTH			
REPETITION FREQ.			
USE LOCATION(s) SITE(s)			
INTENDED USE(s)			
ANTENNA DATA		ASSOCIATED OPTICS	
TYPE AND QUANTITY		LENSES	
DIMENSIONS		FILTERS	
GAIN		OTHER	
RADIATION PROTECTION CONTROLS EMPLOYED/IDENTIFIED			

KSC FORM 16-453 (REV. 4/81)

FIGURE A.13 NON-IONIZING RADIATION PROTECTION SOURCE QUESTIONNAIRE

A5. SAFETY DATA PACKAGE (SDP)

A Flight Safety Data Package (SDP) and a Ground SDP is prepared for each payload. The Flight SDP is limited to payload design and flight operations and the Ground SDP focuses on ground hazards that might exist during pre-launch and post-landing periods. The SDP's are written to the same level of detail as a design review, but the emphasis is directed toward how the hardware complies with applicable safety requirements, as well as control of identified hazards, rather than operational performance requirements. The packages are the result of detailed analysis of the payload systems, GSE, system/component interfaces, procedures and possible hardware failure/human error combinations. This analysis is done to insure not only that nominal or generic safety requirements are met, but that any additional hazards are identified and adequately controlled. The preliminary SDP is prepared after the Payload Accommodations Conference. After final GSFC approval, the HH Mission Manager will submit the Phase O/I Flight SDP to the STS Payload safety review panel at JSC and the Ground SDP to the review panel at KSC for approval. Phase II and III SDPs will be prepared and submitted by GSFC with inputs from the payload organization. The following chart provides an example outline for the SDP.

EXAMPLE FLIGHT SAFETY DATA PACKAGE (SDP) OUTLINE

SECTION

- I. Table Of Contents
- II. Acronyms Abbreviations
- III. Figures And Diagrams

- 1.0 Introduction
 - 1.1 Objectives
 - 1.2 Applicable Documents
 - 1.3 Concept
 - 1.4 Operational Scenario
- 2.0 Payload Description
 - 2.1 Overall Payload Description
 - 2.1.1 Structural
 - 2.1.2 Electrical
 - 2.1.3 Cryogenics
 - 2.1.4 Radiation
 - 2.1.5 Pyrotechnics
 - 2.1.6 Pressure System
 - 2.1.7 Materials
 - 2.1.8 Thermal
 - 2.2 Hitchhiker Hardware Description
 - 2.2.1 Mounting Plate
 - 2.2.2 Adapter Beam
 - 2.2.3 Canister
 - 2.2.4 Hh Avionics
 - 2.3 Flight Operations
- 3.0 Flight Safety Assessment And Verification
 - 3.1 General
 - 3.2 Integrated Payload/Hh Hazard Analysis
 - 3.3 Payload Verification
- Appendix A - Hazard Reports

A Similar Outline Should Be Followed For The Ground SDP And Include Ground Operations.

PAYLOAD SYSTEM SAFETY
DATA SUBMITTAL SUMMARY

Data Submittal	Submittal to GSFC	Updated Submittal to JSC
<i>Flight Safety Data Compliance Package</i>		
PHASE 0/I		
SCDP	L-18 Months	L-16 Months
Presentation & Action Item Responses	L-17 Months	L-15 Months
Phase II		
SCDP	L-12 Months	L-10 Months
Presentation & Action Item Responses	L-11 Months	L-9 Months
Phase III		
SCDP	L-8 Months	L-6 Months
Presentation & Action Item Responses	L-7 Months	L-5 Months
<i>Ground Safety Data Compliance Package</i>		
Phase 0/I		
SCDP	L-18 Months	L-16 Months
(Operations Procedures List & MSDSs)		
Presentation & Action Item Responses	L-17 Months	L-15 Months
Phase II		
SCDP	L-12 Months	L-10 Months
(Preliminary Operations & Hazardous Procedures)		
Presentation & Action Item Responses	L-11 Months	L-9 Months
PHASE III		
SCDP	L-8 Months	L-8 Months
Presentation & Action Item Responses	L-7 Months	L-5 Months
<i>Launch Site Safety</i>		
Final Launch Site Safety documentation including: list of names of KSC I&T teams, function and organization, KSC Operations Procedures, and Final Hazardous Operations Procedures	75 days prior to shipping to KSC	
<i>Verification Tracking</i>		
Ground VTL	L-4 Months	Semi-Weekly Updates
Flight VTL	L-12 Months	Following Phase III Review

FIGURE A.14 PAYLOAD SYSTEM SAFETY DATA SUBMITTAL SUMMARY

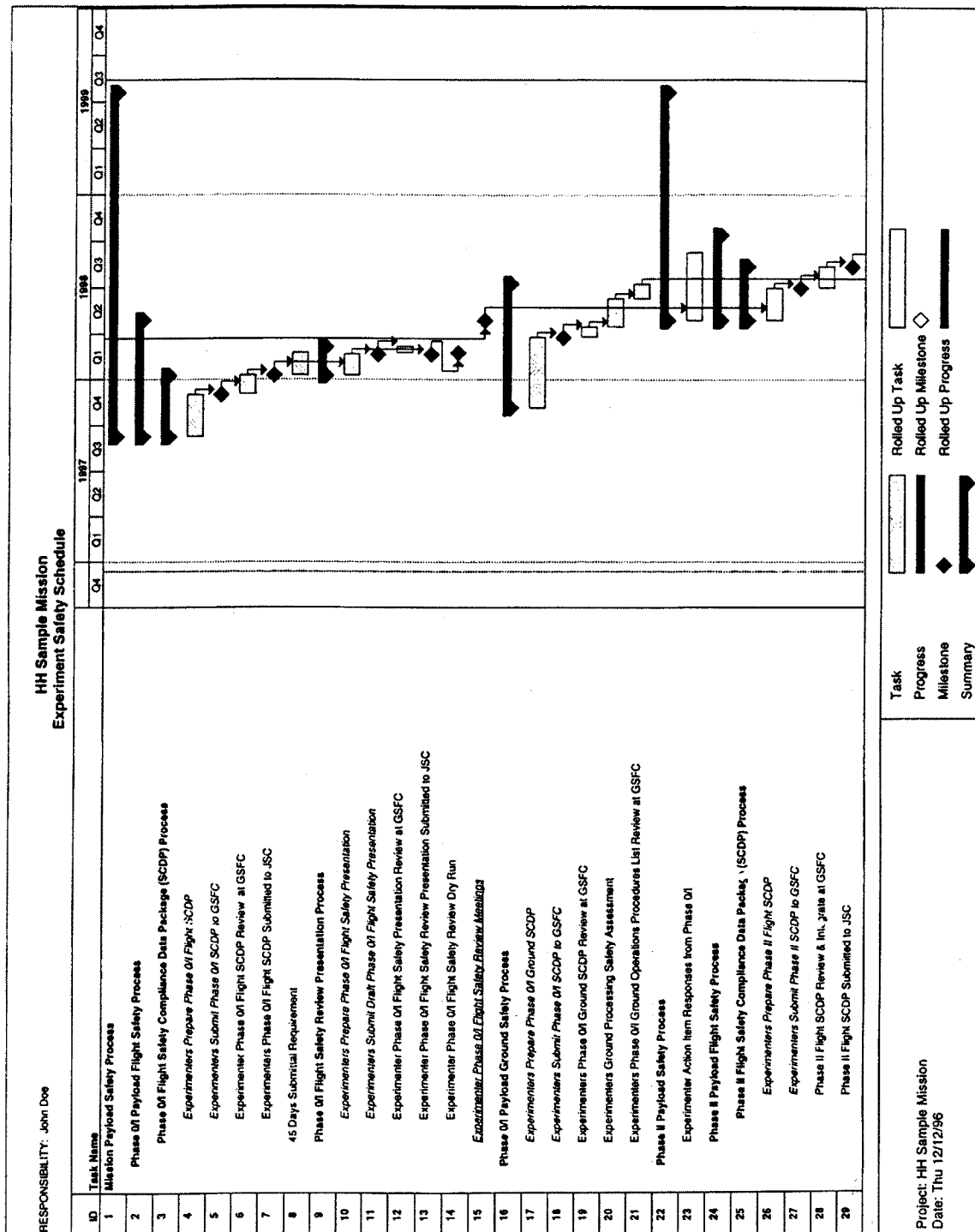


FIGURE A.15 HH SAMPLE MISSION EXPERIMENT SAFETY SCHEDULE

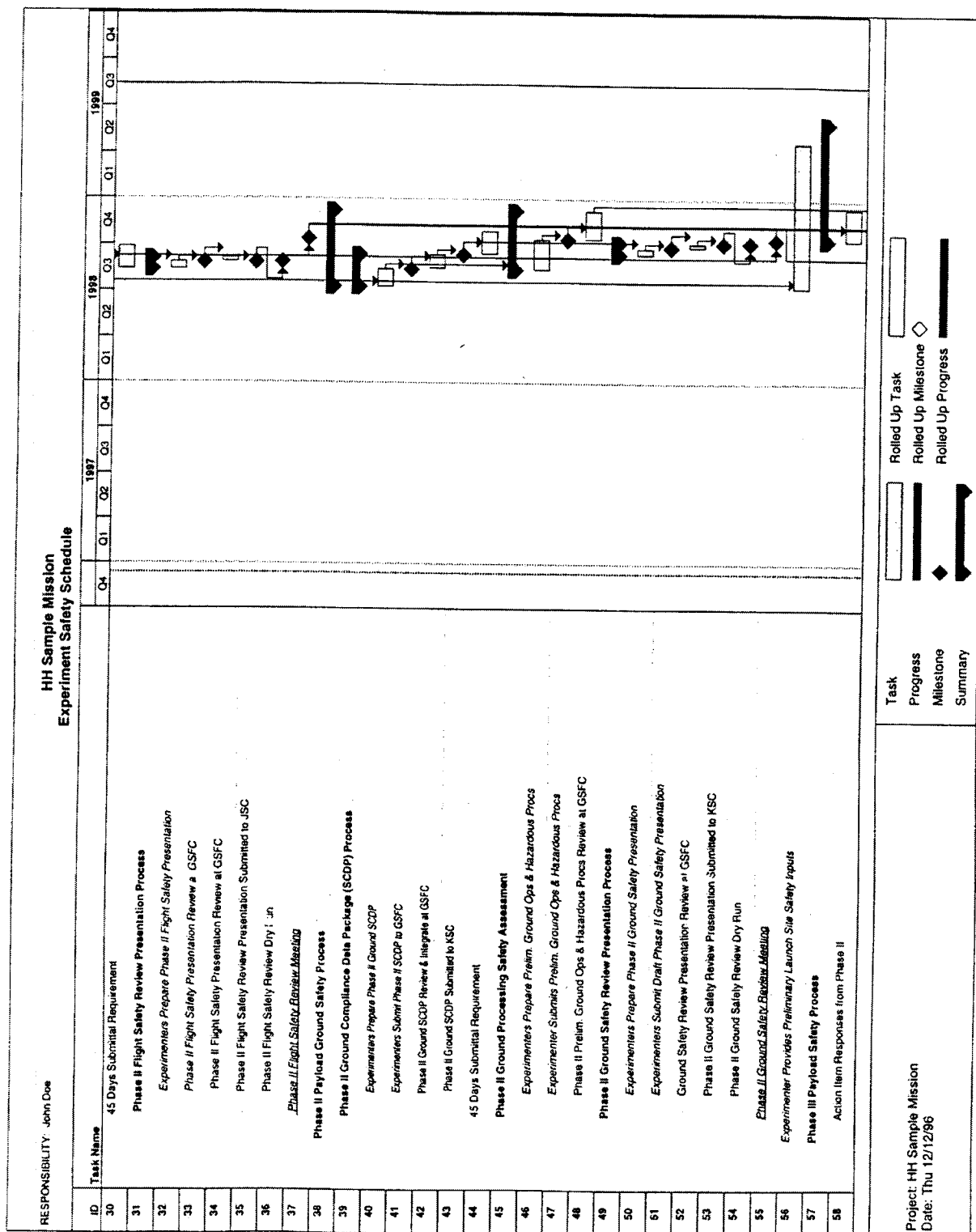


FIGURE A.15 (CONTINUED)

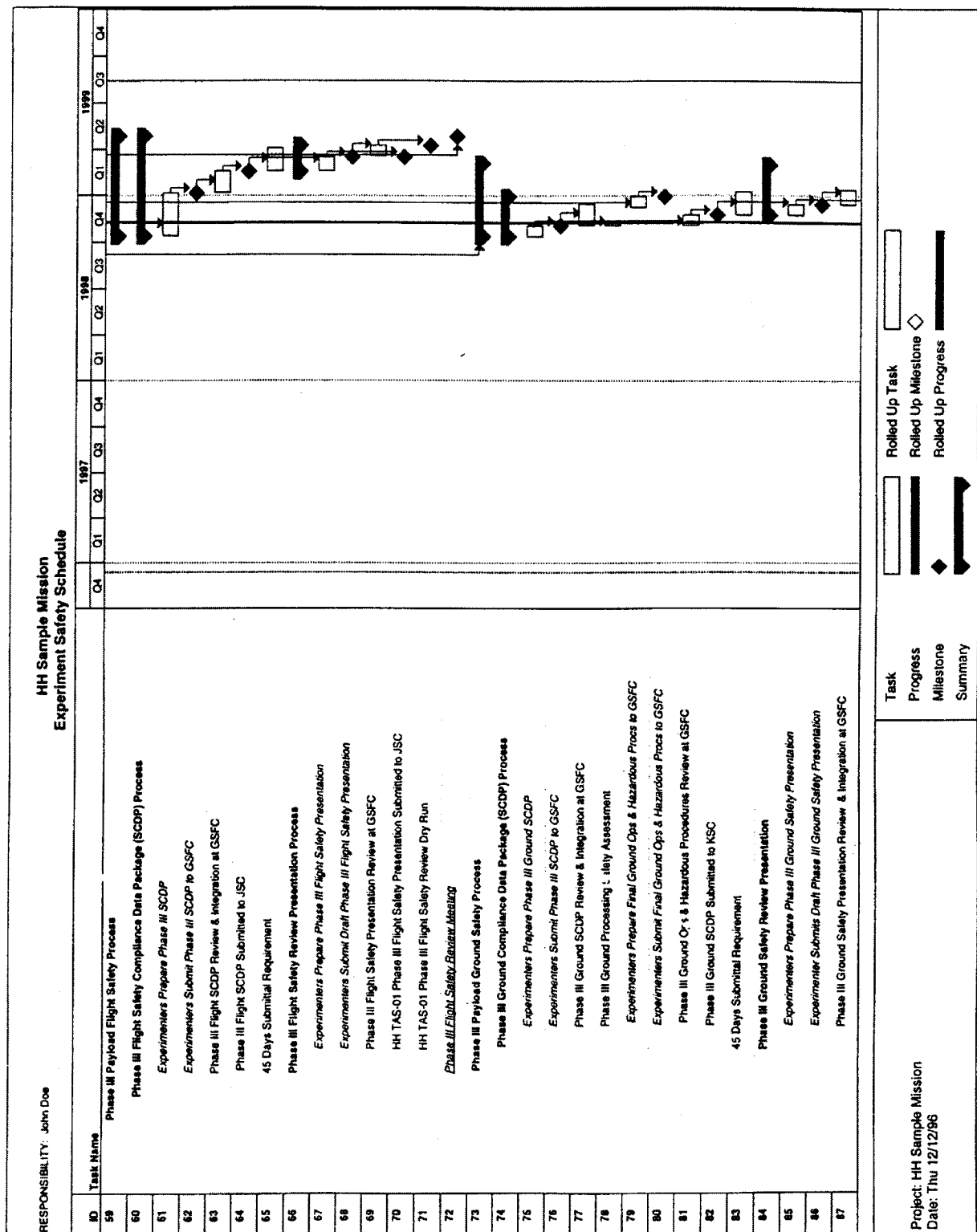


FIGURE A.15 (CONTINUED)

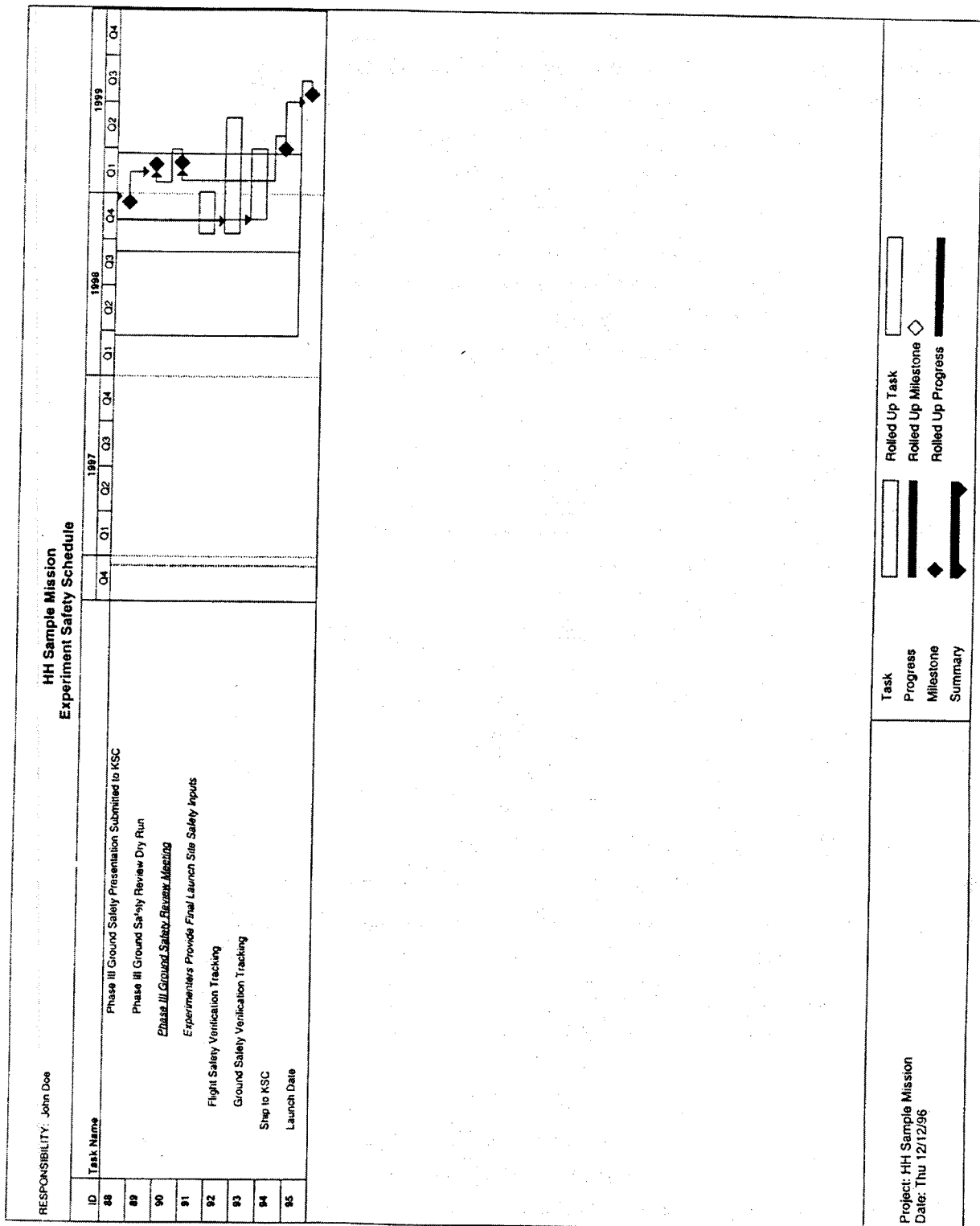


FIGURE A.15 (CONTINUED)